







Be Precise Quickly

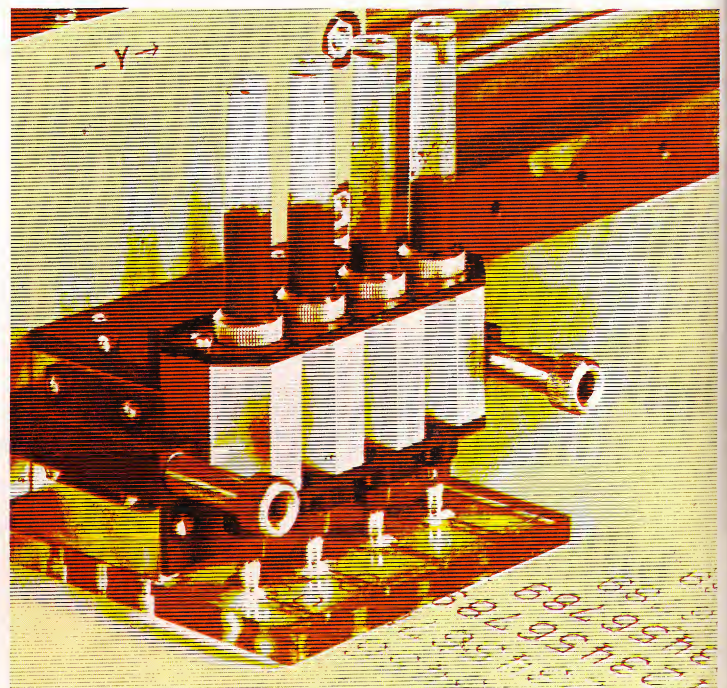
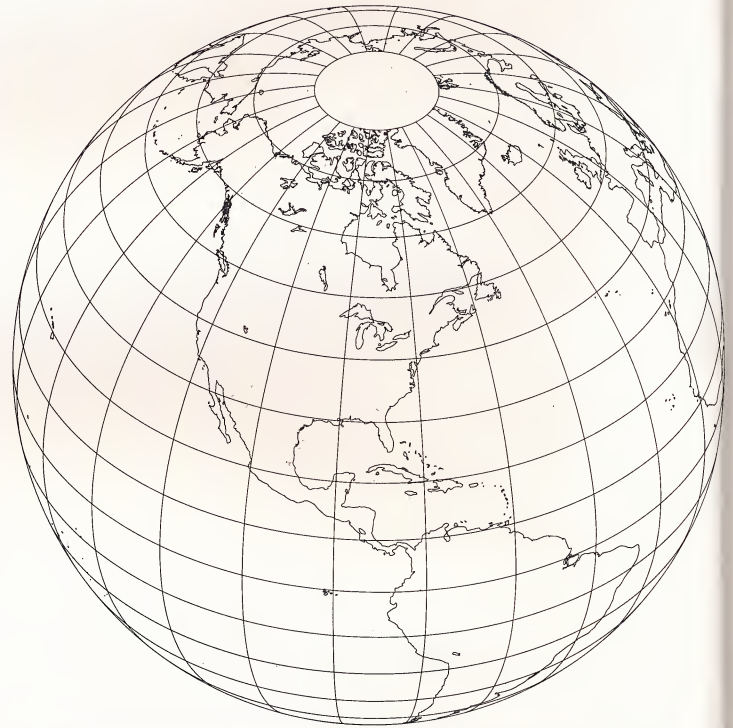
When time and distance mean microseconds and thousandths of an inch, CalComp means performance:

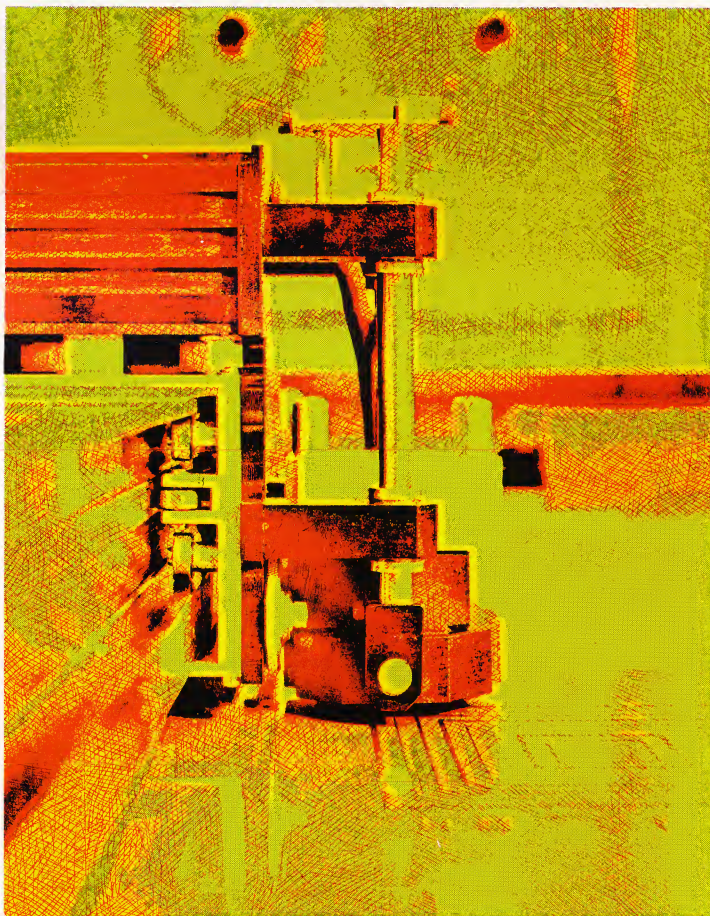
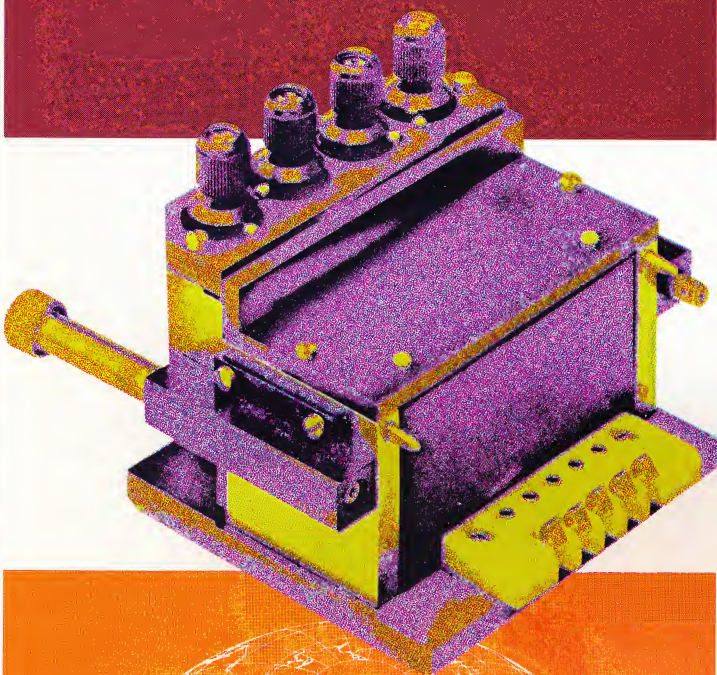


Precision graphics at computer-driven speed with guaranteed accuracy — CalComp's 900/728 system.

Tools to produce finished precision graphics in the form you need — drawn, scribed, optically exposed or cut for stripping — all interchangeable in minutes.

All available now from CalComp.





Lasers and Lineage

CalComp, the world leader in computer graphics, has produced high-speed, highly reliable, very accurate flatbed plotters for four years. During that time, more CalComp Model 718 flatbed plotter systems have been delivered than any other digital flatbed plotting system in the world.

CalComp now offers an extra-accurate improvement on the model 718 — the Model 728. Each Model 728 precision flatbed plotter is calibrated with a laser interferometer to a guaranteed accuracy of ± 0.0012 inch. CalComp periodically verifies that accuracy as long as a Model 728 customer maintains a service agreement.

Model 718 offers the highest throughput of any flatbed system. Model 728 continues this tradition. This means that the average time to complete a job is less with a CalComp system than with any other.

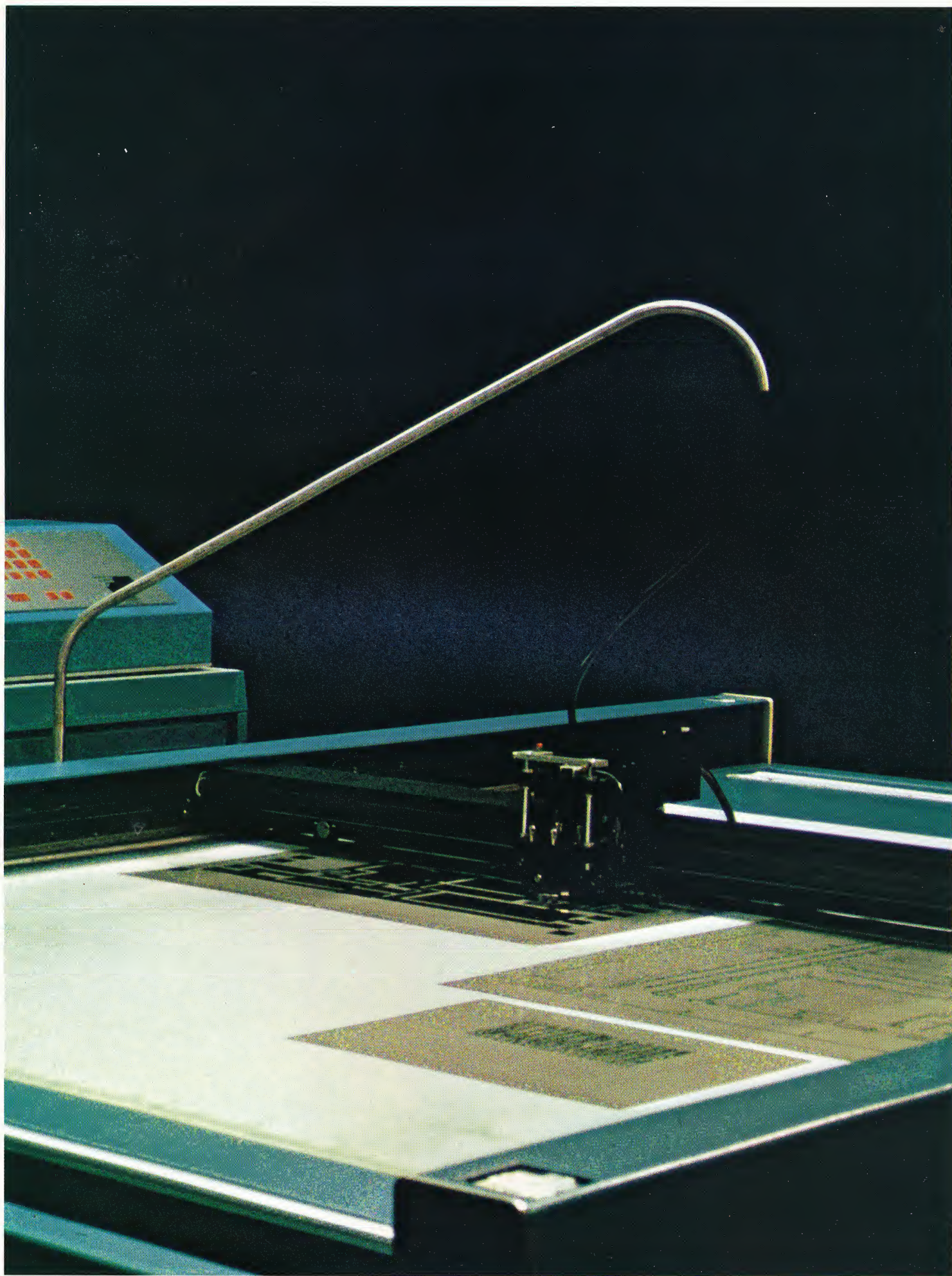
CalComp's Model 900 Controller and Model 937 magnetic tape unit augment throughput some more by making input and output most efficient. Tape-write time savings of 10 to 100 times have been

achieved with this combination, with corresponding savings in total execution time.

Versatility completes the picture of the CalComp Precision Graphics System 900/728. The ease with which plotheads can be interchanged makes it practical to alternate plotting tasks such as strippable film cutting, pen-and-ink plotting, and optical lighthead plotting. For example, replacing the four-pound lighthead with the pen block to run a verification plot is as easy as loosening and retightening three thumbscrews. Liquid ink and ballpoint pens are interchangeable, and scribing or cutting tools are simply and quickly attached.

Full system capabilities include:

- ☐ Simultaneous independent operation of two plotters from multiple magnetic tapes
- ☐ Input/output devices such as card reader, teletypewriter, paper tape reader, remote interfaces, and disk drives
- ☐ Program storage on magnetic tape cartridges
- ☐ Full software support.



Guaranteed Accuracy, Highest Throughput;

Model 937 Magnetic Tape Unit

Input Data Rate to 900 Controller:
30,000 bytes per sec.

Drive:
Single Capstan

Options:
7-Channel System (200, 556, or 800 bpi)
9-Channel System (800 bpi)

Read Speed:
37.5 in. per sec.

Power Requirements:
5 amps @ 115 volts, 60 Hz

Weight:
250 lbs.

Physical Specifications:
Model 937 MTU with Model 900 Controller
39.75 in. wide
24.00 in. deep
62.00 in. high
Combined weight 650 lbs.

Other Features:
Quick-lock hubs
CRT display of block address
Positive error checking and recovery with
900 Controller

Model 900 Controller

Word Size:
9 bits per byte

Memory Size:
4,096/16,384/32,768 bytes

Addressing:
Single address, direct or multi-level indirect

Cycle Time:
2 μ s

Instructions:
Over 100 instructions
Options within the instructions allow:
Auto-indexing
Immediate word operation
Direct and indirect addressing
Single or double word operation

512 word "pages" are the basis for
program operation

Operation Time:
Add 2 cycles
Jump 2 cycles
Load 2 cycles
Copy 1 cycle
Shift 1 cycle

Input/Output:
Direct memory channel operates on cycle-stealing
concept. A maximum of 242,000 word transfers
per second are provided.

Block I/O provides maximum of 500,000
word transfers per second.
Eight I/O channels with interrupt capability.

Console Features:
Four sense switches
Eight indicator lights

Program Loading:
Integral 1,000 word per second magnetic cartridge
read/write tape deck. Simplified program loading.
4,000 word memory loads in less than 5 seconds.

Power Requirements:
4 amps @ 115 volts, 60 Hz

Physical Specifications:
900 Controller with Model 937 MTU:
39.75 in. wide
24.00 in. deep
62.00 in. high
Weight, 400 lbs.
Combined weight, 650 lbs.

Model 728 Precision Flatbed Plotter

Plotting Area:
48 x 72 in.

Static Positional Accuracy:*
48 x 72 in. area: ± 0.0025 in.
20 x 20 in. area: ± 0.0012 in.

*Temperature must be maintained at calibration
temperature $\pm 2^\circ\text{F}$

Speed:
286 in. per min. max. (0.001 in./0.002 in.)
3364 increments per sec. max.

Acceleration:
0.060 sec. to max. speed with any accessory
Acceleration distance from stop to max. speed:
0.1 in.

Optional Step Size:

| Half Step | Full Step |
|-----------|-----------|
| 0.0005 | 0.001 in. |
| 0.001 | 0.002 in. |
| 0.025 | 0.050 mm |
| 0.0125 | 0.025 mm |

Type of Drive:
Digital incremental driven step motors

Command Structure:
24 vector

Vacuum Hold Down:
4 independently controlled vacuum motors,
one in each quadrant.

Table Tilt:
Table can be manually tilted to 0° , 13° , 26° ,
 39° , and 52° (optional vertical mount available)

Control Panel:
One removable master control panel; one remote
control panel at each corner of the table.

Where Precision Counts . . .

Paper Drive:

Paper can be advanced either direction from the master control panel.

Movable Limit Switches:

Movable limit switches can be placed to restrict plothead movement within any area on the drafting surface.

Standard Accessories:

Multiple Liquid Ink/Ballpoint Pen Accessory

Kit No. 10101-101:

Four-station drafting head which accepts either liquid ink or ballpoint pens. Kit includes multiple colored inks, ballpoint and liquid ink pens, and cleaning materials.

Paper Conversion Kit:

Permits use of CalComp 30 in. drum plotter paper.

Weight and Power:

| | Weight | Power |
|--------------------------|--------|--|
| Flatbed Plotter | | |
| 1300 lbs. | | 1750 watts, 15 amps, 115vac, 1Ø, 60 Hz, 5800 Btu per hr. |
| Electronics Control Unit | | |
| 300 lbs. | | 1725 watts, 15 amps, 115vac, 1Ø, 60 Hz, 5800 Btu per hr. |

Dimensions:

| | Length (in.) | Height (in.) | Width (in.) |
|--------------------------|--------------|----------------------------|-------------|
| Flatbed Plotter | | | |
| 113 | | 37.62 horiz. 57.71 tilt | 73 |
| Electronics Control Unit | | | |
| 32 | 37.5 | | 21.5 |

Optional Plotting Tools

Model 7180 Optical Writing System

All-solid-state photo plot head incorporating fiber optics lenses and electroluminescent light sources. Total weight of four pounds provides quick installation and removal. Standard round and square apertures provide for linewidths from 0.374 in. to 0.005 in. Optional special apertures available upon request.

Strippable Film Cutter/Scribe System

Four-station plot head which accepts either sapphire spade bidirectional cutting tools, alloy steel multi-directional cutting tools, or sapphire cone scribing tools. Each tool station is keyed to one of four orientations. Standard scribing tools scribe 0.002, 0.004, 0.006, and 0.008 in. Other widths available upon request.

Pressurized Ballpoint Pen Kit

Kit consists of a set of ballpoint pens in four different colors. Necessary for vertical mounting of flatbed plotter.

Pin-Prick Microscope

Single-station plot head equipped with pin-prick microscope. Valuable for artwork measurement and re-registration.

System Accessories

Paper Tape Reader

300 characters per sec.
Paper tape spooler included
Rewind and fast forward speed of 200 ips

Model 33 or 35 ASR Teletype

ASC II code — 10 cps paper tape I/O rate
character printer

Remote Terminal

Interface to 2000 or 2400 baud synchronous or up to 1800 baud start-stop communication line through EIA RS232B compatible modems (103, 201, 202 data sets)

CalComp CD1 Disk Drive

IBM 2311 compatible
Access time
track-to-track 10 ms
full stroke 60 ms
average 30 ms
10 recording surfaces
6 disks per pack
Disk pack capacity
58 million bits
7.25 million 8-bit bytes

CalComp CD12 Disk Drive

IBM 2316 compatible
Access time
track-to-track 15 ms
full stroke 75 ms
average 45 ms
20 recording surfaces
11 disks per pack
Disk pack capacity
233.408 million bits
29.176 million 8-bit bytes

Controller

CalComp CD14 storage control or equivalent

CalComp CD14 Controller

Comparable with IBM 2314; system utilizes IBM 2316 disk packs or equivalent

Paper Tape Punch

120 characters per sec.

Card Reader

300 cards per min.

Parallel Line Printer

200 lines per min.

Model 472 On-Line Automatic Tracer/Digitizer

Automatic continuous curve follower/digitizer.
Tracer probe senses black/white interface.

Mapping

CalComp has considerable experience in meeting mapping needs. As a prime example, most of the United States' major oil companies are using CalComp systems and software for exploration maps. CalComp also offers application software for subdivision mapping and a full line of systems and software support for other mapping jobs.

CalComp's Precision Graphics System 900/728 can provide the following precision output for cartographic applications:

- ☐ Multiple color or multiple linewidth pen-and-ink artwork on linen, Mylar® or Cronaflex®
- ☐ Scribed multiple linewidth artwork on scribe-coat materials
- ☐ Photographic film artwork
- ☐ Positive or negative plates with large areas cut on strippable film.

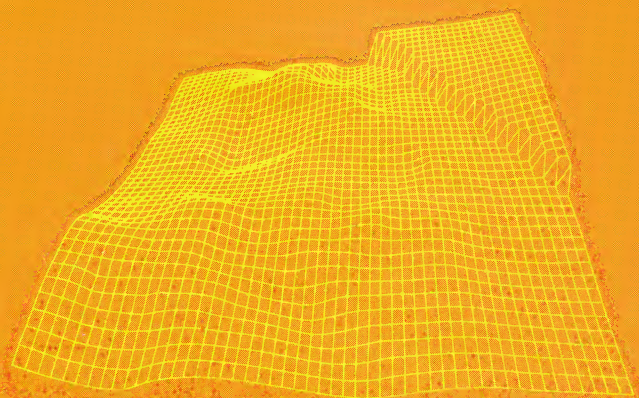


Contour Mapping Software

CalComp's General Purpose Contouring Program (GPCP) is the most accurate program available for automated contour mapping. It can make a map of any suitable data and has been used in widely varying applications to plot such things as seismic, demographic, geological, thermal, and pressure maps and diagrams.

GPCP uses a unique gridding method that automatically computes gridded data from randomly spaced input data, analytically constructing a smooth surface. The user controls gridding and contouring to produce the best maps over a wide range of data distributions. The program has several special features for flexible use, such as the ability to produce stereo views.

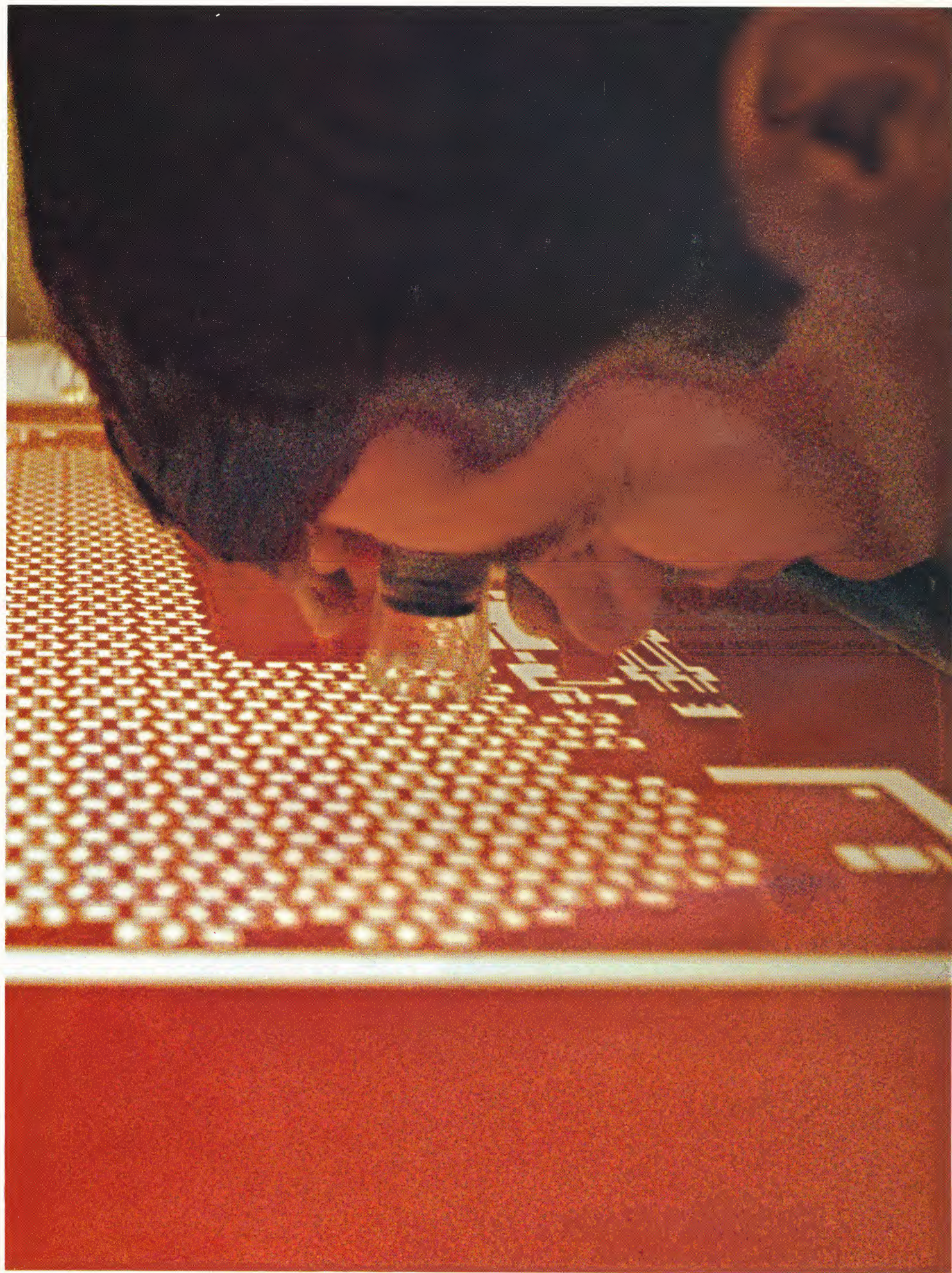
CalComp's THREE-D program makes perspective drawings from data processed by GPCP. Even experienced contour map readers often find this useful — to visualize particular areas and to illustrate findings for the benefit of managers or clients who have less experience with contour maps.



Subdivision Mapping Software

SAMPS (Subdivision and Map Plotting System) can do nearly all of the drafting involved in subdivision planning and mapping. Given a file of points defined by north and east coordinates, SAMPS can do whatever drafting task the user requires, from check plotting through production of final maps, complete with annotation.





Integrated Circuit Design and Production

CalComp's Model 718 has established itself as the best system available — up till now — to produce strippable film integrated circuit masks. CalComp's Precision Graphics System 900/728 adds improved dynamic and static performance and guaranteed accuracy to the established advantages of the 718.

With the 900/728 system, IC masks can be produced on strippable film, or artwork can be done directly on photographic film. A pin-prick microscope is available for artwork measurement and as a registration aid for overplotting.

The system can be operated simultaneously with the CalComp Model 1136 high-speed drum plotter. Using separate Model 937 magnetic tape units, the Model 900 Controller can produce verification plots on the drum plotter while creating finished artwork on the flatbed.

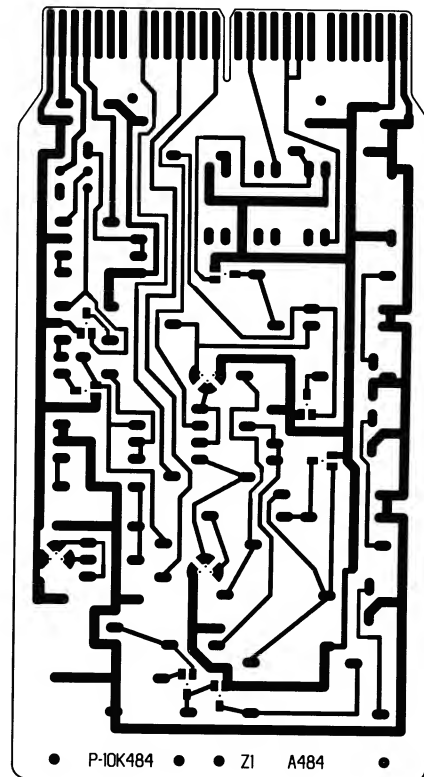
Coupled with CalComp's MASKGEN software, the Precision Graphics System 900/728 makes advanced automated design and production capabilities immediately available to IC manufacturers. MASKGEN permits creation of a computer-stored cell library, automated chip layout and verification, and high-speed automatic circuit artwork production.

Some of the most successful companies in the IC industry have proved that this approach means faster delivery of reliable products. CalComp can now offer others the same competitive ability without requiring program development time.

Printed Circuit Cards

Speed and accuracy plus the operating simplicity and reliability of the Model 7180 lighthead make the CalComp Precision Graphics System 900/728 ideal for printed circuit card artwork production. The lighthead weighs only four pounds, which means it can operate at high speed without overshoot. Its all-solid-state design incorporates fiber-optics lenses and electroluminescent light sources. Standard round and square apertures give linewidths from 0.374 to 0.005 inch. Special apertures such as registration patterns are available on request.

Special software is available for painting in polygons, drawing round or square pads, or controlling plotter speed. The latter provision enables a user to select the maximum plotter speed that produces acceptable quality artwork.



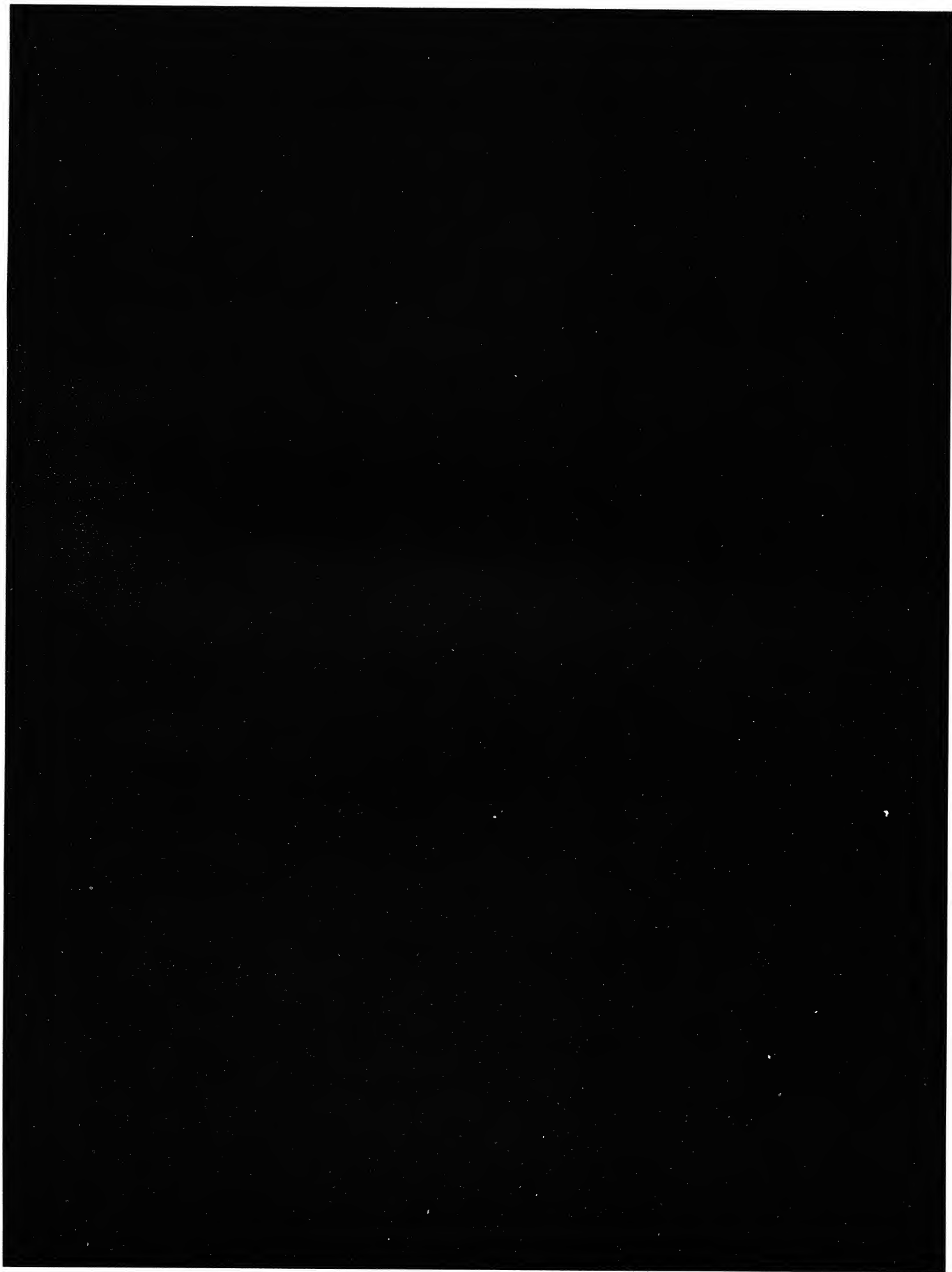
It's Your World



If it turns on precision, CalComp can help you make it a better place.

CalComp's Precision Graphics System 900/728 is ready to deliver guaranteed accuracy in record time.

For more precise details or a quick demonstration, contact your nearest CalComp representative. We have sales and service offices all over the globe.



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